Stoller
Grand Junction Office established 1959

299-W11-61 (A7303)
Log Data Report

Borehole Information:

Borehole: 299-W11-61 (A7303)			**Site:** 216-T-6 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Not deep enough		**GWL Date:**	1/30/2003
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
136,657.81 m	567,188.92 m	July 1947	217.906 m	85.9	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	4.8	8 9/16	7 15/16	0.3125	+4.8	85.9
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS[3], and Chamness and Merz (1993). Zero reference is the top of the 8-in. casing. A reference point survey "X" is located at the top of the casing stickup.

Logging Equipment Information:

Logging System:	Gamma 2A		**Type:** SGLS (35%)
Calibration Date:	9/2002	**Calibration Reference:**	GJO-2002-383-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2/Repeat	3		
Date	2/12/03	2/13/03	2/13/03		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	85.0	60.0	48.0		
Finish Depth (ft)	49.0	49.0	5.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[4]	N/A	N/A		
Pre-Verification	BA200CAB	BA202CAB	BA202CAB		
Start File	BA201000	BA202000	BA202012		
Finish File	BA201036	BA202011	BA202055		

Log Run	1	2/Repeat	3		
Post-Verification	BA201CAA	BA202CAA	BA202CAA		
Depth Return Error (in.)	-0.5	N/A	0		
Comments	Fine-gain adjustment after file -009.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Zero reference was top of the 8-in. casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 082. During SGLS logging, a fine-gain adjustment was needed to maintain the 1460-keV (^{40}K) photopeak at a pre-described channel.

Analysis Notes:

Analyst:	Sobczyk	Date:	03/18/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits established on 12/05/2002. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 1 and 5 percent lower at the end of each day.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AFEB03.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. On the basis of Chamness and Merz (1993), the casing configuration was assumed to be one string of 8-in. casing to total depth (85 ft). The casing correction factor was calculated assuming a casing thickness of 0.3125 in. This casing thickness is based upon the field measurement. A water correction was not needed or applied to the data.

Dead time corrections are required when dead time exceeds 10.5 percent. Dead time exceeded 10.5 percent in the interval from 32 to 42 ft. Maximum dead time was about 57 percent at 34 ft. At SGLS dead time greater than 40 percent, peak spreading and pulse pile-up effects may result in underestimation of activities. Dead time exceeded 40 percent in the interval from 33 to 35 ft. Because this interval is relatively thin, the use of the high rate logging system is not recommended.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. In addition, a comparison log plot of man-made radionuclides is provided to compare the data collected in 1992 and 1995 by Westinghouse Hanford Company's Radionuclide Logging System (RLS) with SGLS data. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected near the ground surface (6 through 13 ft) at a concentrations ranging from the MDL (0.2 pCi/g) to 1.0 pCi/g. ^{137}Cs was detected in the interval from 23 through 66 ft. The range of concentrations was from the MDL to 1,970 pCi/g, which was measured at 34 ft.

Recognizable changes in the KUT logs occurred in this borehole. A change of 5 pCi/g or more in apparent ^{40}K concentrations occurs between 30 and 40 ft. This increase in ^{40}K concentrations may represent the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for both the man-made and natural radionuclides (661, 609, 1461, 1764, and 2614 keV).

Gross gamma logs from Fecht et al. (1977) (attached) indicate that the sediments surrounding this borehole contained significant amounts of gamma-emitting contamination as early as 1963 through at least 1976. The logs from 4/26/63 and 5/6/76 detected gamma activity above background in the interval from 20 ft (6 m) to 49 ft (15 m). The SGLS detected ^{137}Cs between 23 and 66 ft.

Comparison log plots of data collected in 1992 and 1995 by Westinghouse Hanford Company and in 2003 by Stoller are included. The 1992 and 1995 concentration data for ^{137}Cs are decayed to the date of the SGLS logging event in February 2003. Since 1992, ^{137}Cs activities appear to have decreased as predicted by radioactive decay.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

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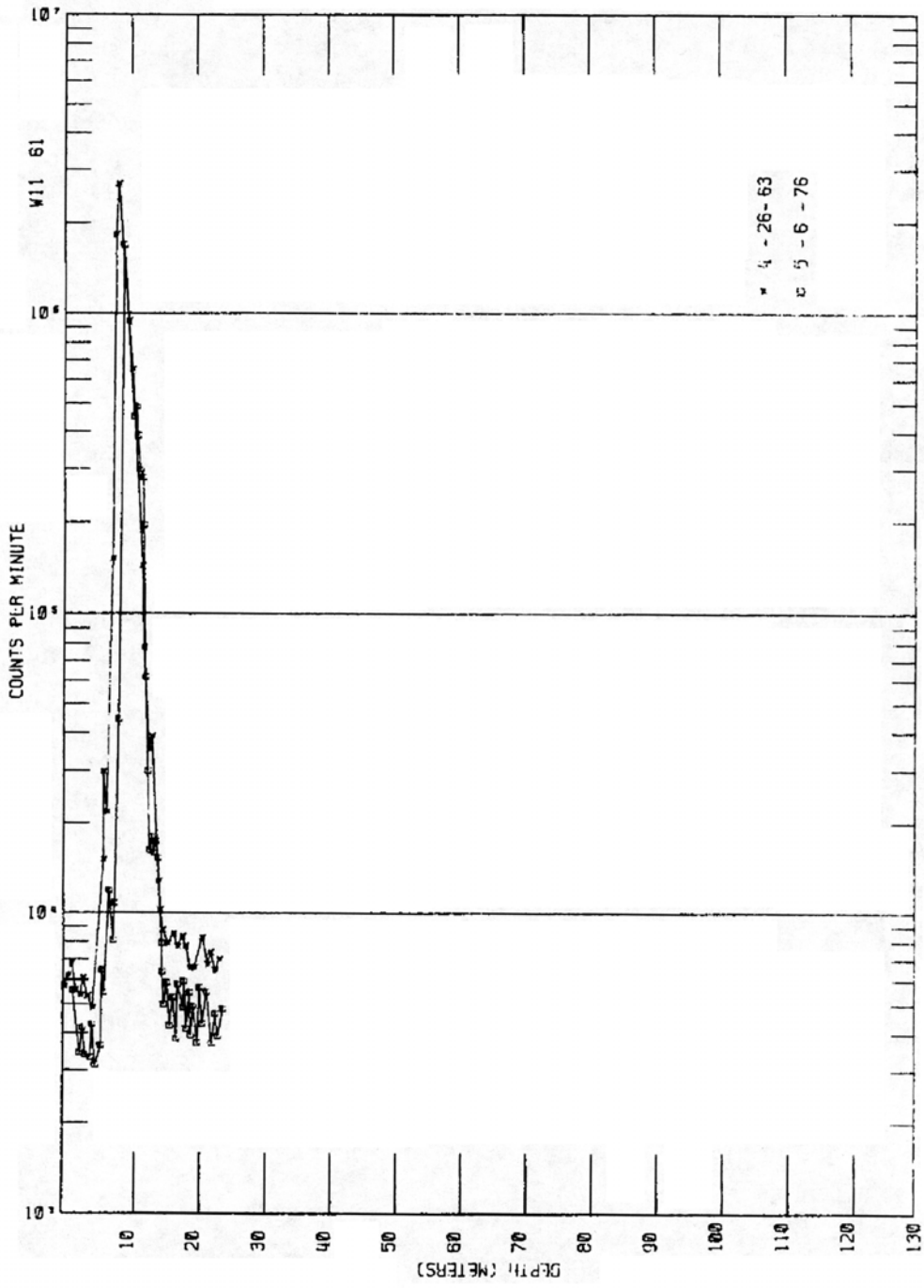
[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

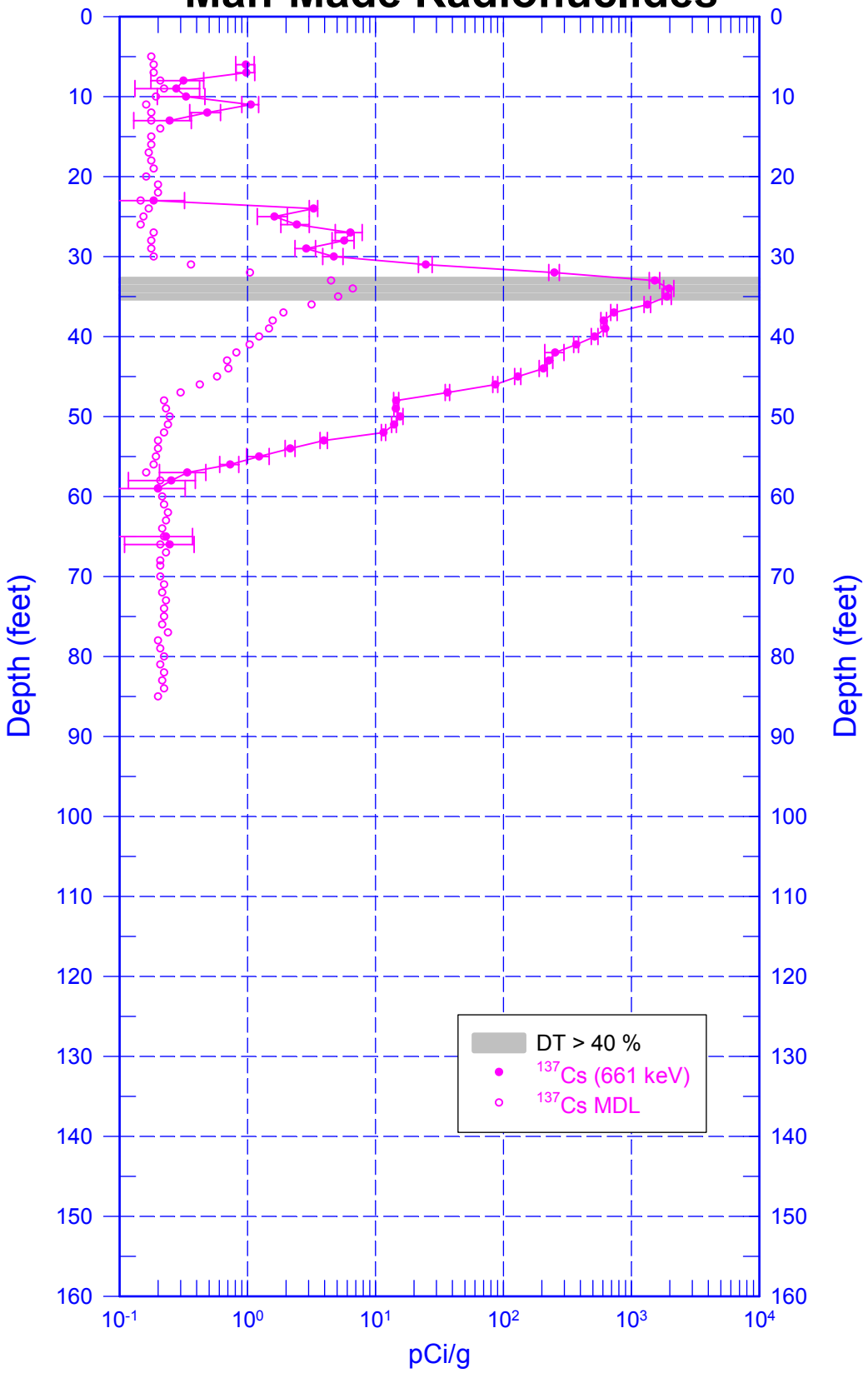


from Fecht et al. (1977)

Scintillation Probe Profiles for Borehole 299-W11-61, Logged on 4/26/63 and 5/6/76

299-W11-61 (A7303)

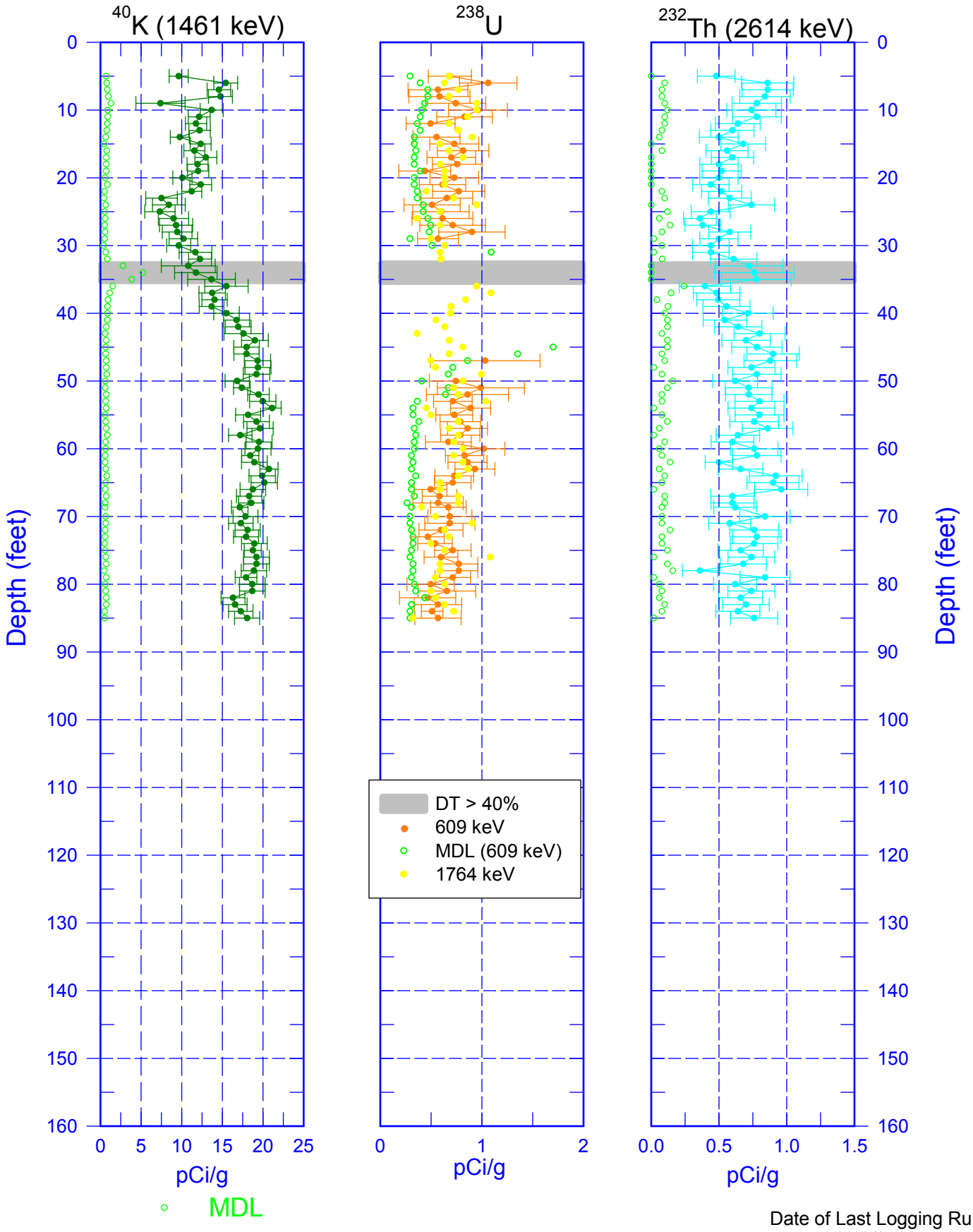
Man-Made Radionuclides



Zero Reference = Top of Casing

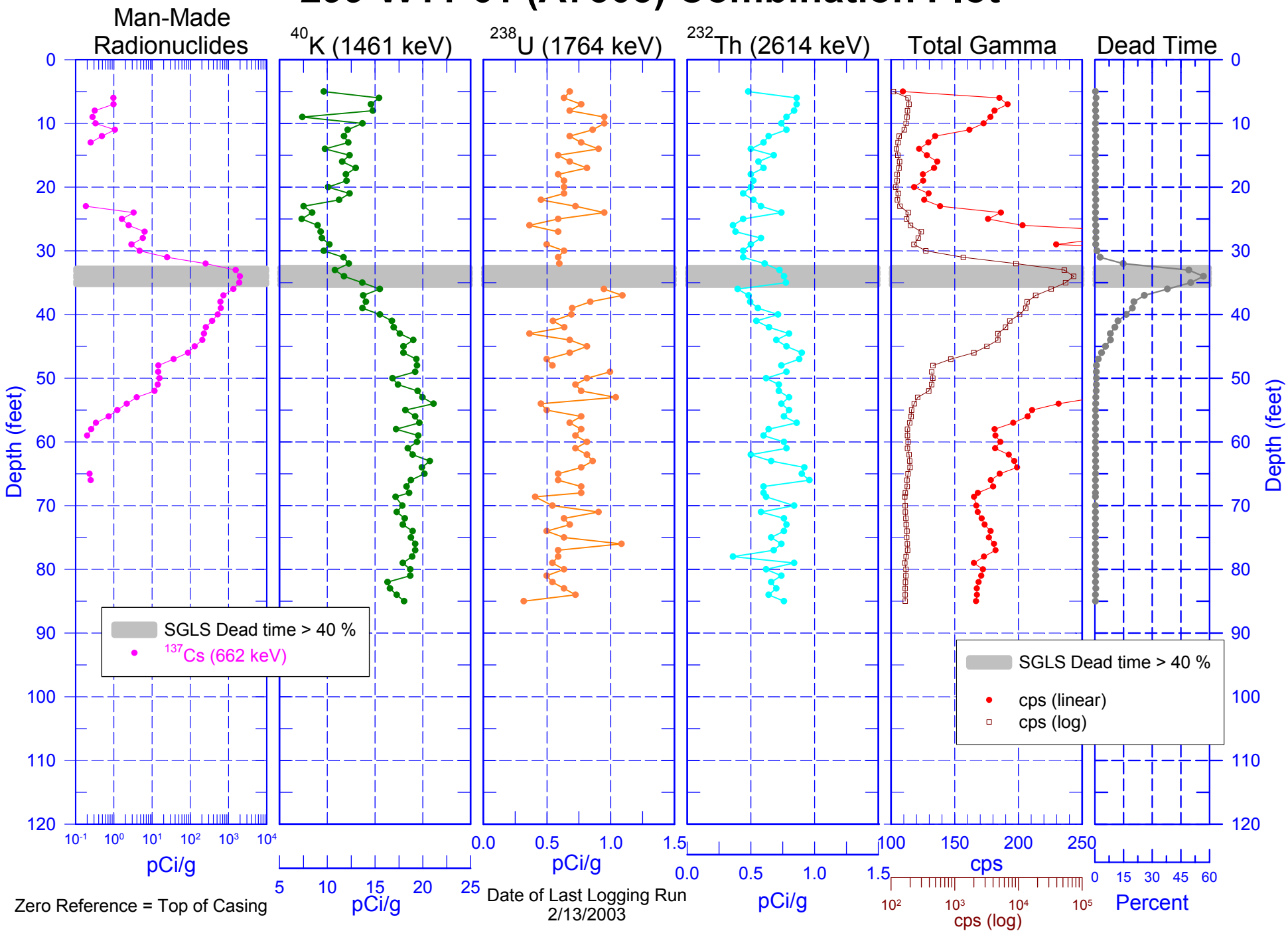
Date of Last Logging Run
2/13/2003

299-W11-61 (A7303)
Natural Gamma Logs

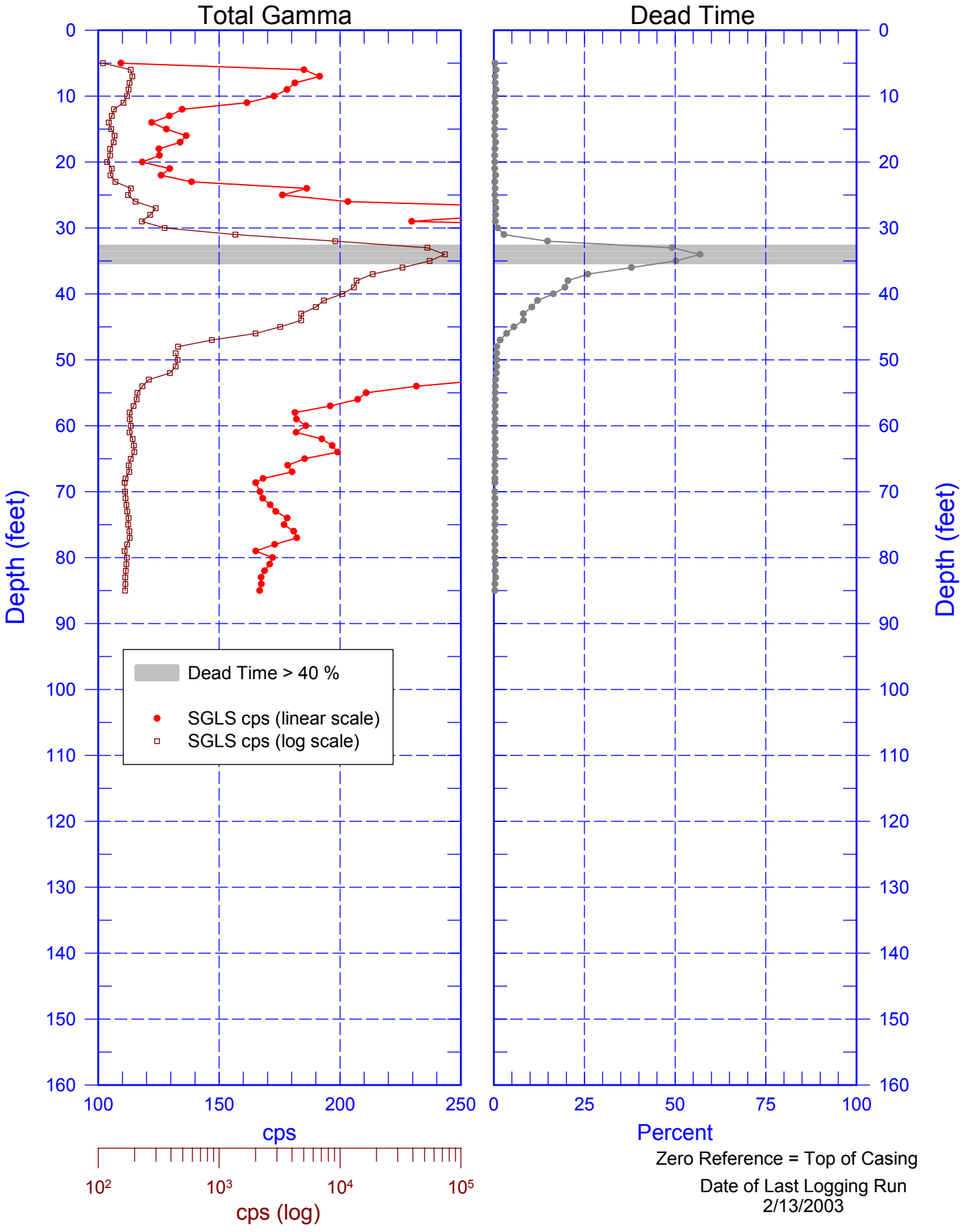


Zero Reference = Top of Casing

Date of Last Logging Run
2/13/2003


299-W11-61 (A7303) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
SGLS Dead time > 40 %
137Cs (662 keV)
pCi/g
cps (linear)
cps (log)
cps
Percent
Zero Reference = Top of Casing
Date of Last Logging Run
2/13/2003

299-W11-61 (A7303)
Total Gamma & Dead Time



Zero Reference = Top of Casing

Date of Last Logging Run
2/13/2003

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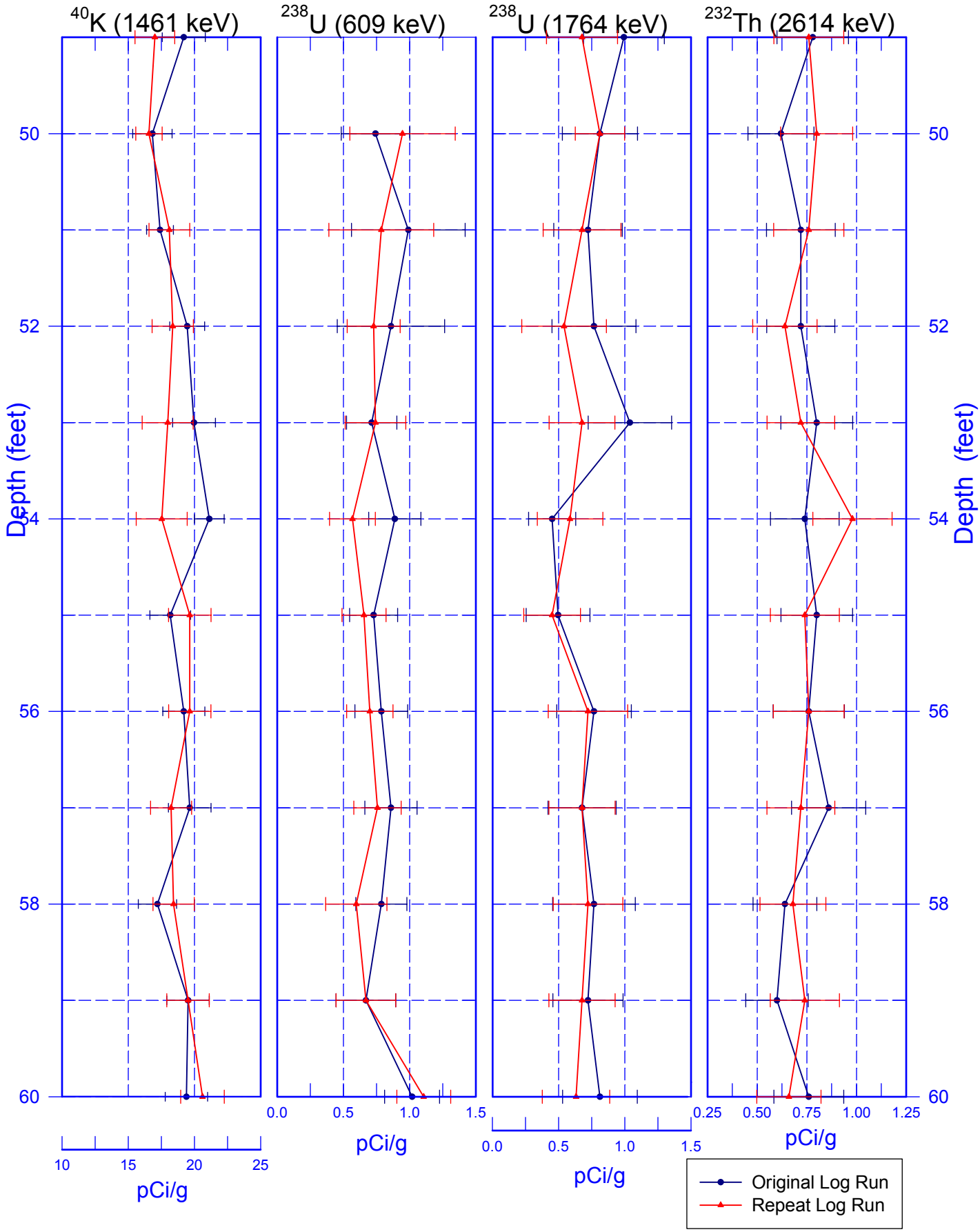
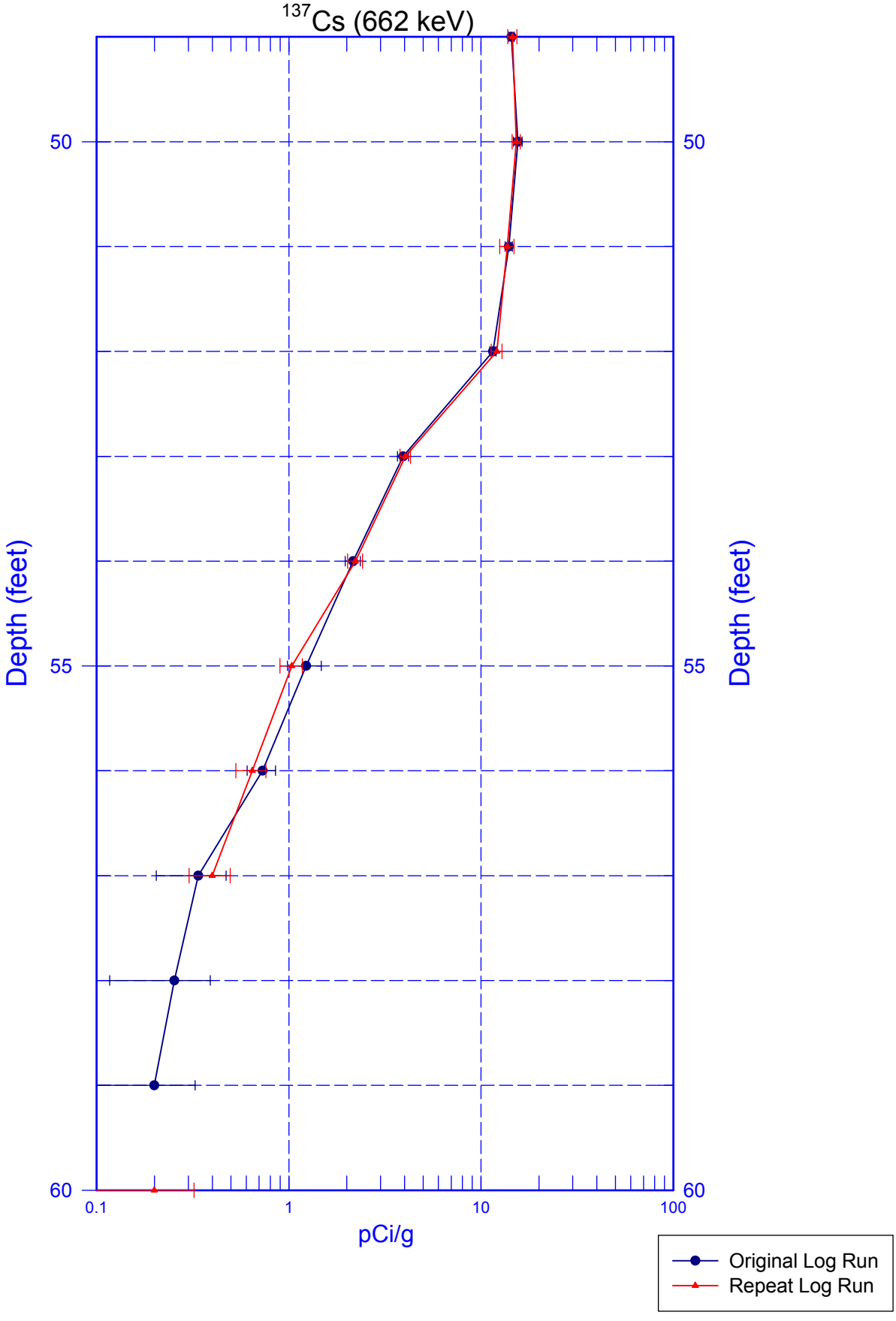
Rerun of Natural Gamma Logs (60.0 to 49.0 ft)



299-W11-61 (A7303)

Rerun of Man-Made Radionuclides (60.0 to 49.0 ft)



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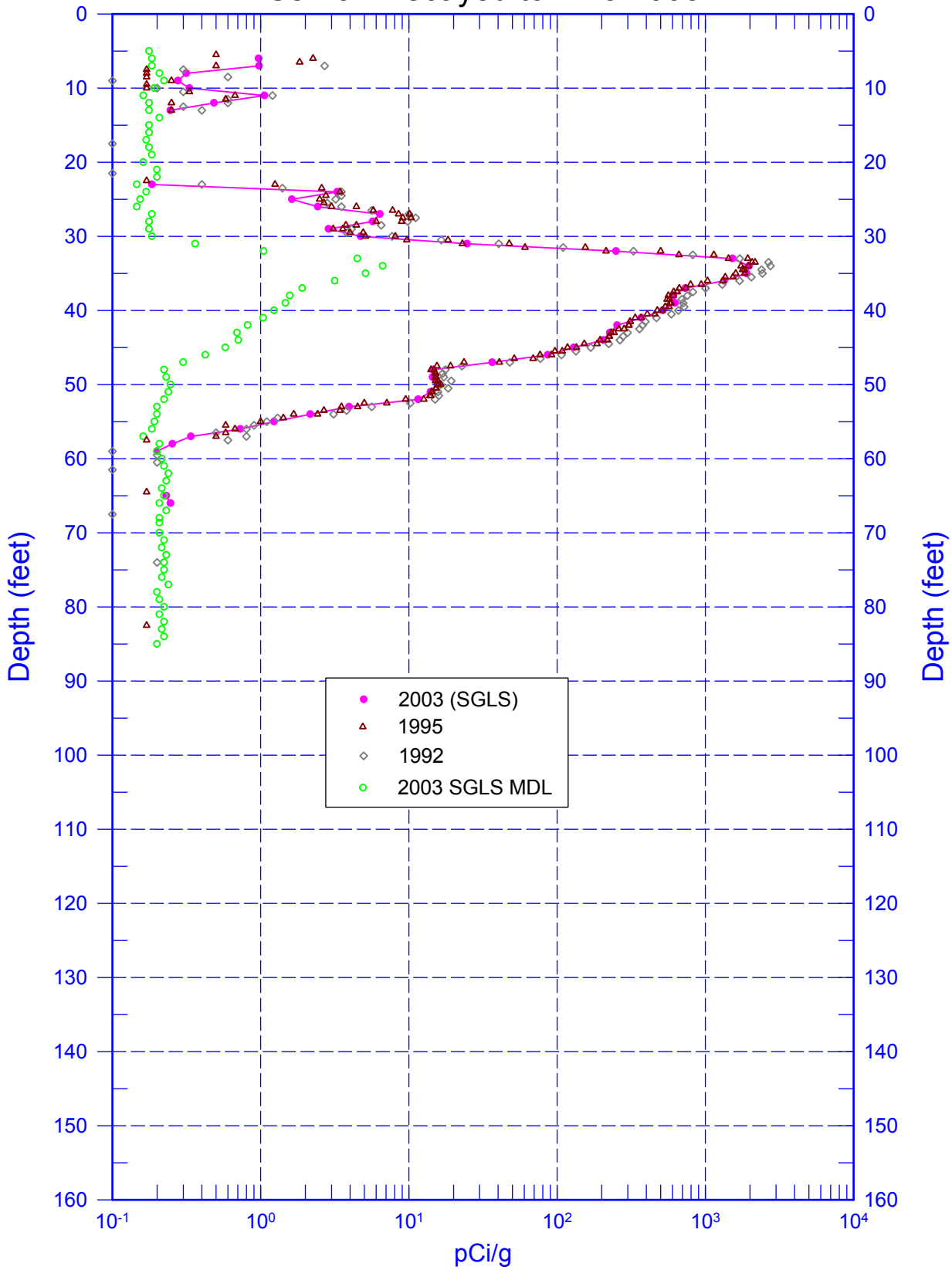
RLS Data Compared to SGLS Data

Cs-137 Decayed to 2/13/2003



Zero Reference = Top of Casing (2003 SGLS & 1995 RLS)
1992 RLS Data Shifted +7.0 ft